

**MICHIGAN STATE**  

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**UNIVERSITY**

# Project Plan Presentation Provider Analysis Toolkit

The Capstone Experience

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*From Students...  
...to Professionals*

# Project Sponsor Overview

- Sponsor Overview
  - Smart platform for processing ancillary insurance claims
  - Owned by Delta Dental
  - 22M+ members managed
  - \$972M in total cost savings

Roosevelt  
simple. seamless. smart.



# Project Functional Specifications

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- Application will be used by fraud analysis teams to identify fraud in processed dental insurance claims
- Existing project will be updated to include social features, optimizations, and expanded ML capabilities
- Expanded capabilities of the application will allow users to save labor hours, improve communications and increase accuracy



# Project Design Specifications

- Project will add sharing and commenting on specific providers
- The project will expand the scope of the current ML models to process more data, improve anomaly detection
- Users can build a watchlist, share providers from their watchlist and see data visualizations for any provider quickly and in an efficient manner



# Screen Mockup: Home

Technology Solutions to Innovate x

rooseveltsolutions.com

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Welcome Nicole!

## Home

**Total Providers**  
300 Providers

**Total Services:**  
123 services

**Average Days:**  
123 days

### Top N Filter

State: MI Effective specialty: Periodontist Score Category: Select Category Total Plan Pay: Select Plan Total Pt Count: Select Range

State	Specialty Desc	Provider ID	(\$ Total Plan Pay	Total Number of Days with Trea...	Total # of Patients
MI	Periodontist	123445 MI	123595.2	123	126
MI	Periodontist	234535 MI	132452.5	25	563
MI	Periodontist	234562 MI	59432.0	67	163
MI	Periodontist	491948 MI	34874.23	195	75

Add to Watch List



# Screen Mockup: Home

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MI Periodontist 491948 MI 34874.23 195 75

Add to Watch List

**Shared With Me**

	Specialty Desc	Provider ID	(\$ Total Plan Pay	Total Number of Days with Trea...	Total # of Patients
Feb 1	General Pract.	878811 IN	123595.2	99	1232
Jan 27	Periodontist	234535 OH	132452.5	69	344
	Oral Surgeon	313313 MI	59432.0	100	95
	Public Health	496948 OH	34874.23	42	32
Jan 25	Orthodontist	4969483	34874.23	200	133

Add to Watch List Remove from Shared



# Screen Mockup: Provider Summary

The screenshot displays the Roosevelt website's 'Provider Summary' page. The browser address bar shows 'rooseveltsolutions.com'. The page header includes the Roosevelt logo and a 'Welcome Nicole!' message. A sidebar on the left contains navigation icons for Home, Summary, Detail, and Watch List. The main content area features search filters for 'Provider ID' and 'Provider Name', an 'Add to Watch List' button, and a 'Share Provider with' button (highlighted in red) with the email 'bsmith@RooseveltInnovations.com'. Below these are fields for 'PID', 'Full Name', 'License Specialty', 'Effective Specialty', 'License Status', 'Status Reason', 'FR Status', 'Primary TIN', 'Primary Address', and 'Primary City'. A row of five yellow boxes displays ranks: Overall Rank (2), SRP Rank (3), MjrRest Rank (3), Fillings Rank (3), and CLEAR Score (3). The 'Practice Overview' section includes a table with metrics like Patients (177), Total Plan Pay (\$216,852), and Avg Plan Pay Per Pt (\$1,225), along with a 93% Commercial bar chart and a horizontal bar chart for procedure types: Diagnostic, Preventive, Restorative, and Endodontics.

Overall Rank	SRP Rank	MjrRest Rank	Fillings Rank	CLEAR Score
2	3	3	3	3

Practice Overview	
Patients	177
Total Plan Pay	\$216,852
Avg Plan Pay Per Pt	\$1,225

Procedure Type	Percentage
Diagnostic	~10%
Preventive	~20%
Restorative	~50%
Endodontics	~20%



# Screen Mockup: Provider Summary

The screenshot shows a web browser window displaying the Roosevelt Solutions website. The browser's address bar shows the URL "rooseveltsolutions.com". The website header features the Roosevelt logo with the tagline "simple. seamless. smart." and a "Welcome Nicole!" message. The main content area is divided into several sections:

- Practice Locations:** 1
- FR Performance:**
  - FR Services In Scope: 157
  - FR Review Rate: 99%
  - FR Denial Rate: 100%
  - Estimated FR Savings: \$33,187
- Appeals:** 1
- Grievances:** 1
- Internally Identified Claim Recoupments:** 3
- Internal Referrals:** 1
- External Referrals:** 1
- Audits:** 1
- License Actions:** 1
- Other FWA Cases:** 1

On the right side, there is a "Provider" selection dropdown and two buttons: "Go to Utilization Detail" and "Go to Report Card".

Below these sections is a table with columns: "Locations", "Shared Locations", "FWA Case Detail", "A&G Detail", and "FR Hx".

Provider L...	TIN	Business Name	Address	City	State	Participation
Fake Inc.	****	A business	123 Fake St.	Lansing	MI	45%

At the bottom, a "Discussion" section is highlighted with a red box. It contains two messages:

- Sarah Lynn** (23 minutes ago): "This provider needs to be checked out."
- Bee Smith** (18 minutes ago): "The denial rate is too high."





# Screen Mockup: Provider Analysis

The screenshot shows a web browser window displaying the Roosevelt Solutions website. The browser's address bar shows the URL "rooseveltsolutions.com". The website header features the Roosevelt logo with the tagline "simple. seamless. smart." and a user greeting "Welcome Nicolie!".

## Provider Analysis

**Top N Filter**

State: MI Effective specialty: Periodontist Score Category: Select Category Total Plan Pay: Select Plan Total Pt Count: Select Range

State	Specialty Desc	Provider ID	(\$ Total Plan Pay	Total Number of Days with Trea...	Total # of Patients
MI	Periodontist	123445 MI	123595.2	123	126
MI	Periodontist	234535 MI	132452.5	25	563
MI	Periodontist	234562 MI	59432.0	67	163
MI	Periodontist	491948 MI	34874.23	195	75

**Add to Watch List**

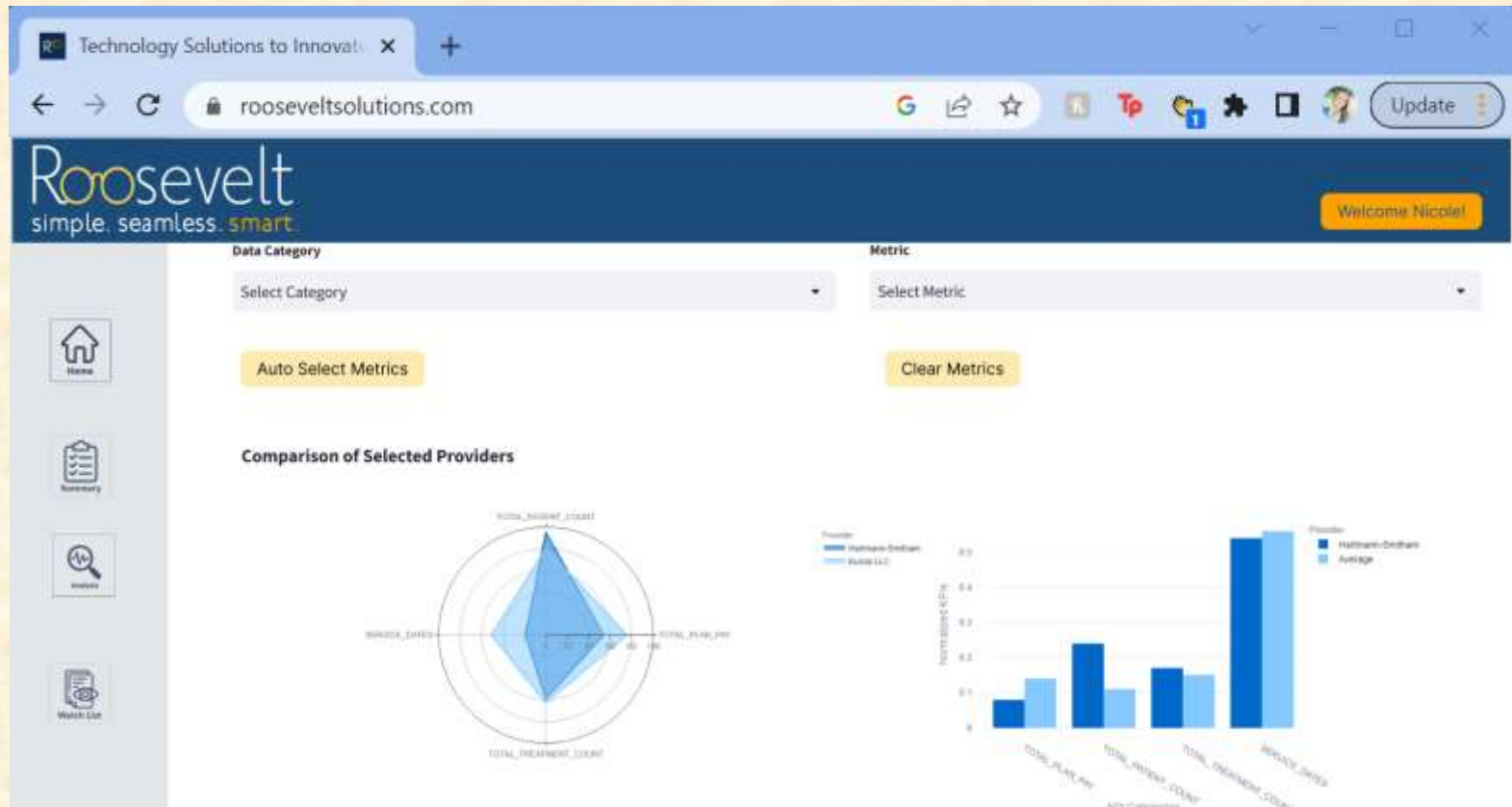
Provider: Spencer LLC, MI, Flint

**Metric Filter**

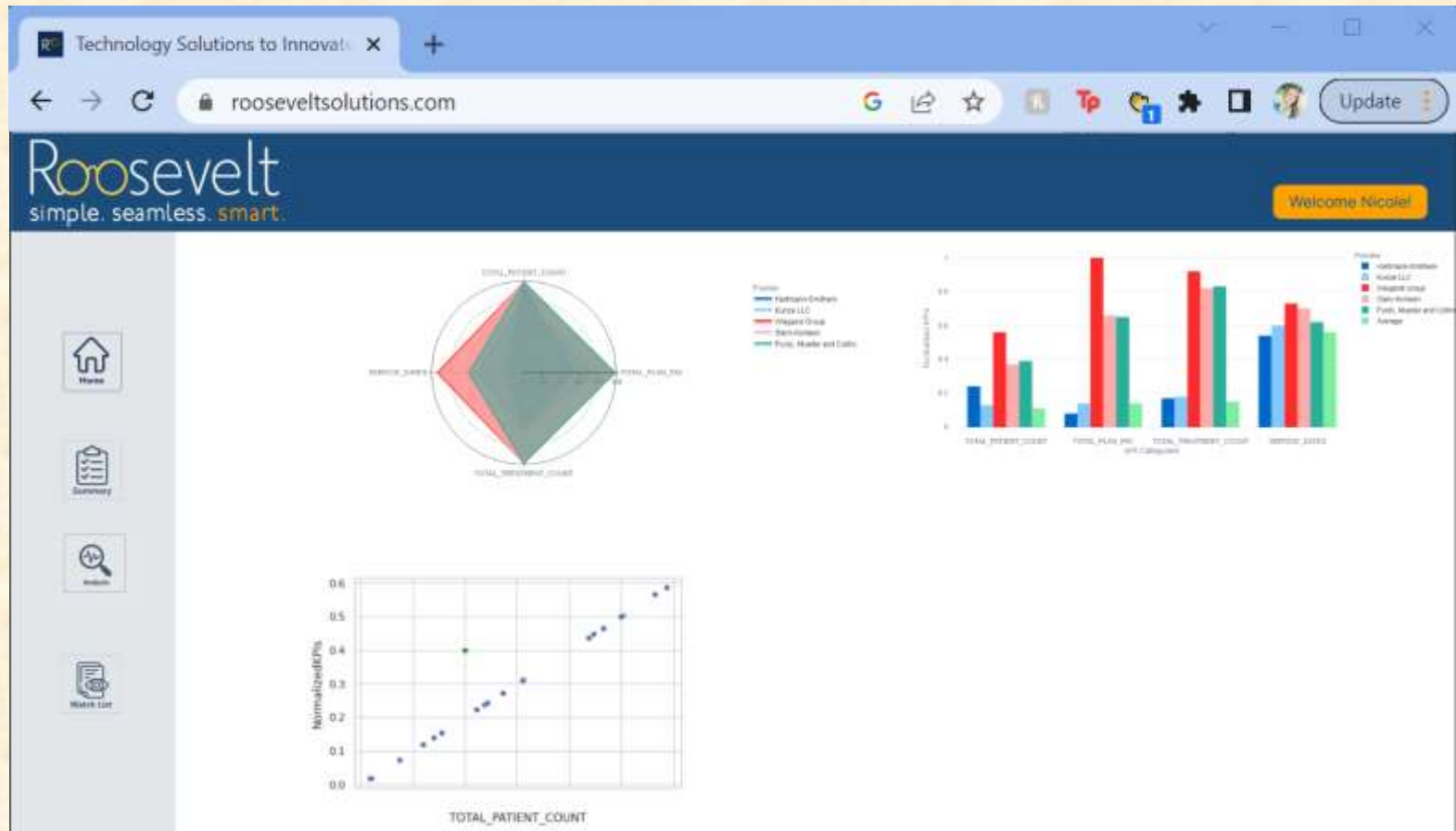
Data Category Metric



# Screen Mockup: Provider Analysis



# Screen Mockup: Provider Analysis



# Screen Mockup: Watch List

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## Watch List

State	Specialty Desc	Provider ID	(\$ Total Plan Pay	Total Number of Days with Trea...	Total # of Patients
MI	Real LLC	1234456	123595.2	123	126
MI	Kozey Co	2345354	132452.5	25	563
MI	Mraz-Beahan	2345674	59432.0	67	163
MI	Whoton	4969483	34874.23	195	75

Remove from Watch List

Download PDF

### Shared With Me

Specialty Desc	Provider ID	(\$ Total Plan Pay	Total Number of Days with Trea...	Total # of Patients	
Feb 1	General Pract.	878811 IN	123595.2	99	1232
Jan 27	Pedodontist	234535 OH	132452.5	69	344
	Oral Surgeon	313313 MI	59432.0	100	95
	Public Health	496948 OH	34874.23	42	32

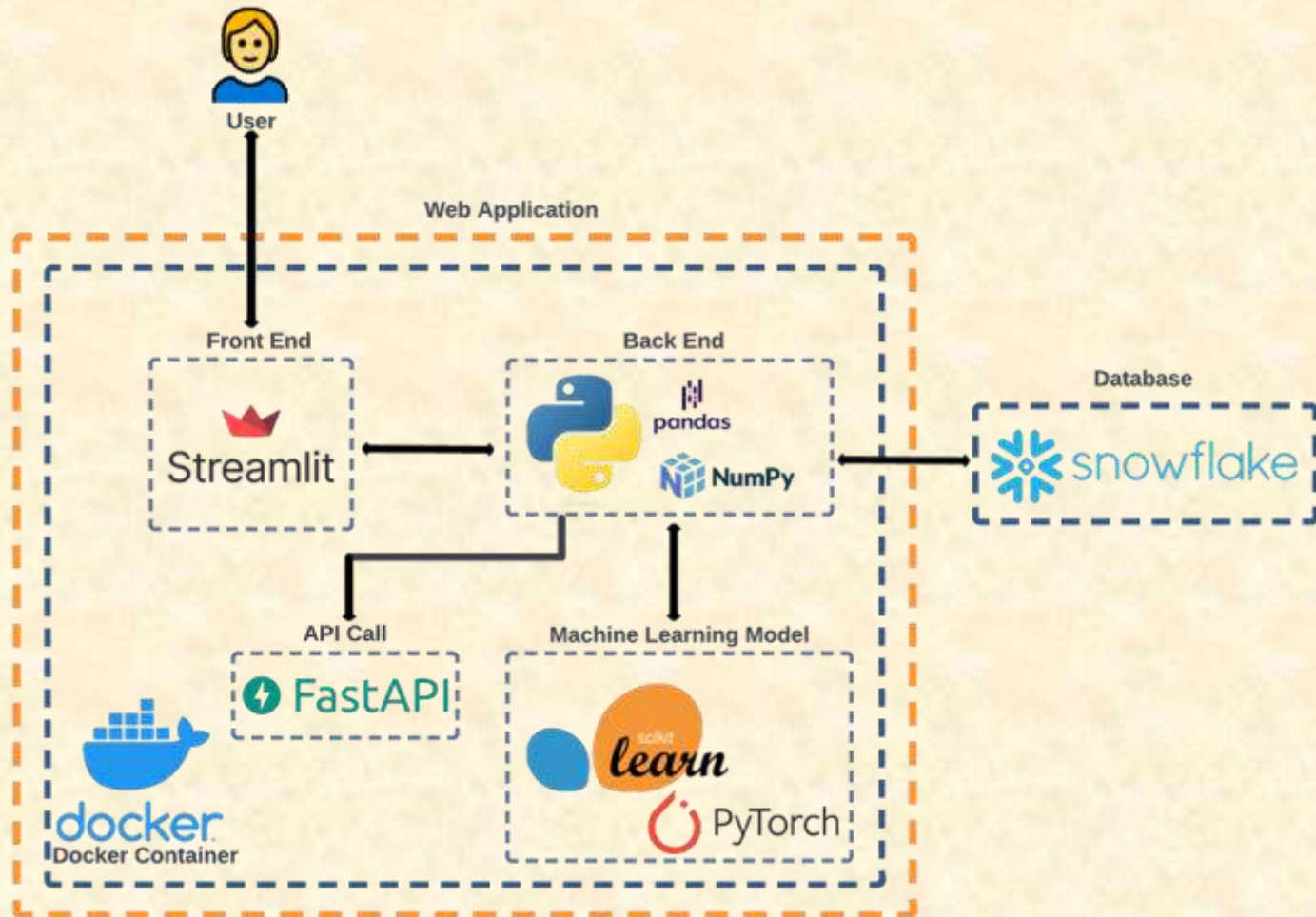


# Project Technical Specifications

- Front-end development is done using Streamlit, a Python data visualization library
- All the data is hosted on Snowflake
- Python will be used as the primary coding language
- System is hosted in a Docker container
- Unsupervised Machine Learning models will be used for anomaly detection
- FastAPI will be used for making an API
- Docker for fast, efficient, scalable containerization web app



# Project System Architecture



# Project System Components

- Infrastructure Technologies
  - Docker
  - Snowflake
- Software Technologies
  - Python
  - Python Libraries:
    - Streamlit
    - pandas
    - NumPy
    - PyTorch
    - scikit-learn
    - FastAPI



# Project Risks

## •Risk 1

- Streamlit front-end library is not customizable
- Look at the documentation and work with the available components

## •Risk 2

- Identifying useful business features from the claims data to train the ML model
- Use the unsupervised ML model to find outliers and then work with the clients to determine if the provider is a fraud or not based on given conditions

## •Risk 3

- Identifying the most suitable UI for the non-technical team to work with
- Work with the business analyst team in determining the technical information they need from the ML models; additionally, need to add features depending on the needs of the feature

## •Risk 4

- Streamlit pages can easily get computationally expensive and take a long time to load, which means any interaction with the app and Streamlit will rerun the app
- Will have to do some clever optimizations and consider caching pages or using many conditional if statements to prevent larger functions from running/rerunning





# Questions?

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